NOVEMBER/DECEMBER 2024

GCH33/DCH33 — PHYSICAL CHEMISTRY – III

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Compare polarization and over potential.

2. Classify the metals based on passivity and give an example of each type.

3. Differentiate piezo electricity and ferro electricity of solids.

4. How does an edge and screw dislocations happen in solids?

5. Give the selection rules of electronic spectroscopy.

6. Non-rigid rotator or rigid rotator model describes the rotational motion more accurately. – Justify your answer.

7. Give a short note on shielding and deshielding in NMR spectroscopy.

8. Point out the internal standard for ^{31}P NMR.

9. Give each one example of Maxwellions, Bosons and Fermions.

10. When the Stirling approximation will be useful? Why?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Discuss the mechanism of the hydrogen evolution reactions.

Or

(b) Illustrate the areas and lines of a Pourbaix diagram with suitable example.

12. (a) Find the magnetic moment of V^{4+} and Zn^{2+}.

Or

(b) Write a short note on non-stoichiometric defects in solids.

13. (a) Explain the assumption, conclusion and violation of Franck-Condon principle.

Or

(b) Discuss the Stoke's and Anti-Stoke's lines.

14. (a) Give short notes on "Reverse Zeeman Effect" and "Nuclear Zeeman Effect".

Or

(b) NMR spectra of ^{13}C, ^{19}F and ^{31}P nuclei – Give examples and explain.

15. (a) Explain the Maxwell - Boltzmann distribution law.

Or

(b) Compare and comment on the concepts of thermodynamic and mathematical Probabilities.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Derive Butler-Volmer equation for one step one electron transfer reactions and explain the electrodics.

17. Give an account on the optical properties of solids.

18. Describe the vibrational spectra of polyatomic molecules.

19. Discuss the fourier transformation resonance spectroscopy.

20. Explain the rotational partition functions for mono and diatomic ideal gases.

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